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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 4 :
A62B 18/00, 18/08, B65H 75/34
B65H 75/38, 75/48

A1

(11) International Publication Number: WO 90/02582

(43) International Publication Date: 22 March 1990 (22.03.90)

(21) International Application Number: PCT/US89/03856

(22) International Filing Date: 7 September 1989 (07.09.89)

(30) Priority data:
244,134 14 September 1988 (14.09.88) US

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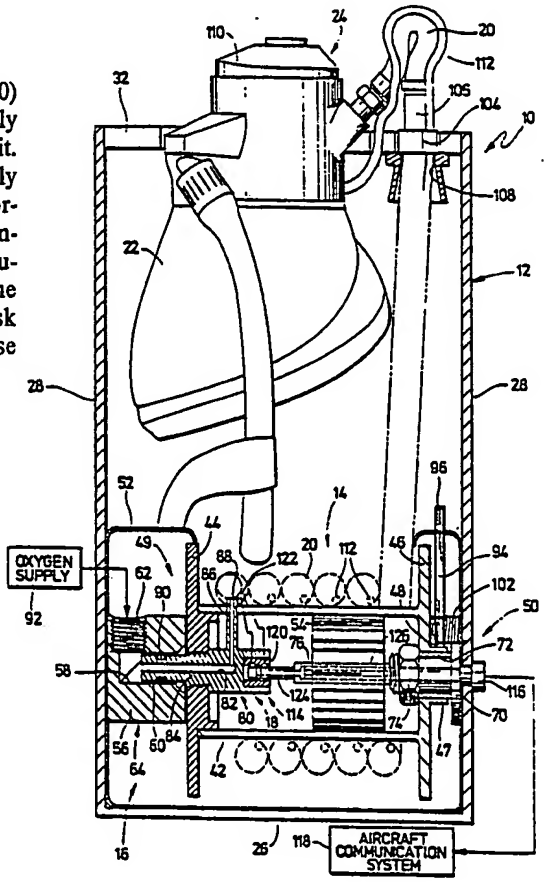
(81) Designated States: AT, AT (European patent), AU, BB, BE (European patent), BF (OAPI patent), BG, BJ (OAPI patent), BR, CF (OAPI patent), CG (OAPI patent), CH, CH (European patent), CM (OAPI patent), DE, DE (European patent), DK, FI, FR (European patent), GA (OAPI patent), GB, GB (European patent), HU, IT (European patent), JP, KP, KR, LK, LU, LU (European patent), MC, MG, ML (OAPI patent), MR (OAPI patent), MW, NL, NL (European patent), NO, RO, SD, SE, SE (European patent), SN (OAPI patent), SU, TD (OAPI patent), TG (OAPI patent).

Published
With international search report.

(54) Title: CREW OXYGEN MASK AND HOSE STOWAGE UNIT

(57) Abstract

An aircraft oxygen mask (22) and supply hose stowage unit (10) is provided which retracts and conveniently stows the oxygen supply hose (20) as the mask is moved toward a stowage position on the unit. The preferred unit includes a housing (12) with a hose reel (14) rotatably mounted therein and a rotary oxygen connector (18) having a fixed portion (64) coupled with the housing (12) and presenting an inlet for connection to an oxygen source (92), and a rotary portion (80) fixedly coupled with the reel presenting an outlet. The oxygen hose intercouples the connector outlet (86) on the reel (14) and the mask (22) and as the mask (22) is moved toward the stowage direction the reel (14) wraps the hose (20) thereabout to conveniently stow the hose (20).



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CREW OXYGEN MASK AND HOSE STOWAGE UNIT

Background of the Invention

1. Field of the Invention

The present invention relates to an aircraft oxygen mask and supply hose stowage unit which retracts and conveniently stows the oxygen supply hose as the mask is moved from an in-use position to a stowage position on the unit. More particularly, the present invention concerns a housing having a rotatable reel contained therein which is biased in a stowage direction for wrapping the oxygen hose therearound in order to conveniently stow the hose and the mask when not in use.

2. Description of the Prior Art

A typical aircraft crew member's oxygen mask and accompanying oxygen supply hose are stowd in a box adjacent the crew member's seat. In order to use the oxygen mask, the crew member removes it from the box with the supply hose trailing along with it. When the oxygen mask is no longer needed, the crew member often lays the mask and oxygen supply hose on the deck adjacent the seat rather than neatly stowing them in the box because of inconvenience of doing so or because of insufficient time due to the demands of flying the aircraft. With the mask and supply hose lying on the floor, they are subject to damage, dirt, and may even present a tripping hazard.

Summary of Invention

The prior art problems as outlined above are solved by the aircraft oxygen mask and supply hose stowage unit of the present invention. That is to say, the unit hereof conveniently stows an oxygen

supply hose and an oxygen mask when no longer in use.

Broadly speaking, the preferred embodiment of the present invention includes a housing with a hose reel rotatably mounted therein. The preferred unit also includes a rotary oxygen connector which includes a fixed portion coupled with the housing having an inlet for coupling with an oxygen source, a rotary portion rotatably and fluidically coupled with the fixed portion and fixedly coupled with the reel and having an oxygen outlet. A flexible oxygen hose fluidically intercouples the connector outlet with an oxygen mask. The unit also includes means for stowing the mask in a stowage position. The hose reel is selectively rotatable in a first direction for stowing successive portions of the oxygen hose thereon as the oxygen mask is being shifted to the stowage position, and for selective rotation in an opposed second direction for delivering successive portions of the hose from the reel during shifting of the mask toward an in-use position.

Preferably the hose reel is biased toward rotation in the first or stowage direction and the unit further includes a releasable reel stop coupled with the reel for releasably preventing rotation in the first direction. The reel stop preferably takes the form of the pawl and the cam combination which prevents retraction of the hose during use once extended and which is preferably manually releasable by a crew member in order to wrap the oxygen hose around the reel for stowage.

The oxygen mask is desirably equipped with a microphone to allow a crew member to use the aircraft communication system while wearing the mask. Accordingly, the preferred unit hereof in-

cludes a rotary microphone connector having a fixed section coupled with the housing and including a first terminal for coupling with the aircraft communication system and a rotary section rotatably and electrically coupled with the fixed section and having a second terminal for electrically coupling with a microphone cable. The microphone cable electrically interconnects the microphone and the second terminal. The microphone cable and oxygen hose are preferably coupled in a side-by-side relationship so that they are simultaneously stowed and delivered by the hose reel.

Other preferred aspects of the stowage unit are set forth hereinbelow.

Brief Description of the Drawing Figures

Fig. 1 is a perspective view of the preferred stowage unit showing the oxygen mask and oxygen supply hose in their respective stowage positions;

Fig. 2 is a sectional view of the stowage unit shown in Fig. 1;

Fig. 3 is a plan view of the stowage unit;

Fig. 4 is a partial sectional view of the stowage unit of Fig. 1 with portions cut away for clarity illustrating the pawl and cam arrangement; and

Fig. 5 is a partial perspective view of the interior of an aircraft illustrating the stowage unit in use by an aircraft crew member.

Detailed Description of the Preferred Embodiment

Referring now to the drawing figures, and in particular to Figs. 1, 2, and 3, stowage unit 10 includes housing 12, hose reel 14, hose reel mount-

ing assembly 16, rotary oxygen connector 18, oxygen hose 20, oxygen mask 22, and microphone electrical assembly 24.

Housing 12 includes bottom wall 26 and four side walls 28 presenting an open top. Walls 26 and 28 are preferably composed of aluminum or other lightweight metal. Housing 12 also includes a pair of mask-holding doors 30 and 32 which are coupled to opposing side walls 28 adjacent the top thereof by respective door hinges 34, and a pair of outwardly extending mounting flanges 36 and 38 (Figs. 1 and 3) coupled to opposed sidewalls near the top thereof adjacent respective door hinges 34. Doors 30 and 32 open upwardly and are shown in the open position in Fig. 5 and in the closed position in Figs. 1-4, and are configured to cooperatively define mask stowage opening 40. Doors 30, 32 are preferably composed of synthetic resin material.

Hose reel 14 is preferably composed of aluminum and/or other synthetic resin material and presents a spool-shaped configuration for wrapping oxygen supply hose 20 therearound as shown in Fig. 2. Reel 14 is configured to present a central tubular body 42 having respective left and right flanges 44 and 46 coupled to opposed ends thereof (Fig. 2). Right flange 46 includes structure defining an axially aligned mounting bushing 47 and four ratchet cams 48 around the periphery of bushing 47 on the outboard side of flange 46.

Hose reel mounting assembly 16 is designed to rotatably mount hose reel 14 within the housing 12 and includes left mounting structure 49, right mounting structure 50, aluminum sheet metal enclosure 52 (preferably aluminum), and coil spring 54.

Left mounting structure 49 includes mounting block 56 configured to define right-angled delivery passage 58 therein which includes connector opening 60 and internally threaded, oxygen inlet 62. Mounting block 56 along with connector opening 60 and oxygen inlet 62 make up fixed portion 64 of rotary oxygen connector 18 as will be explained further hereinbelow.

Right mounting structure 50 includes base 70, externally threaded shaft extension 72 coupled thereto and received through bushing 47 as shown in Fig. 2, lock nut 74, and coupling piece 76 extending inwardly and coaxially from extension 72.

Enclosure 52 presents a generally C-shaped configuration opening upwardly as shown and designed to fit snugly adjacent bottom wall 26 and sidewalls 28 with left and right mounting structures 49, 50 respectively coupled thereto which allows hose reel mounting assembly 16 to be treated as a unitary structure and dropped into place within housing 12.

Biasing spring 54 is a conventional ribbon-type, wind-up or "clock" spring having its inboard end coupled to attaching piece 76 and the outboard end coupled with the interior surface of reel tubular body 42.

Hose reel 14 is rotatable in a first or stowage direction (the top of reel 14 into the page as viewed in Fig. 2) and a second, opposed, direction so that reel rotation in the second direction winds spring 54 in order to bias hose reel 14 in the stowage direction.

Rotary oxygen connector 18 includes fixed portion 64 as described above and L-shaped rotary portion 80 having oxygen passage 82 defined therethrough which includes externally threaded central

block 84, outlet pipe 86 connected at a right angle thereto terminating at oxygen outlet 88, and O-ring 90.

Central block 84 is threadably received through and axially aligned with a corresponding, internally threaded, axially aligned hole defined in left flange 44 so that a portion of central block 82 extends into connector opening 60 with O-ring 90 providing a seal therebetween. Outlet pipe 86 extends through the wall of reel tubular body 42 and terminates on the outboard side thereof at oxygen outlet 88. Oxygen passage 82 fluidically intercouples oxygen outlet 88 with connector opening 60 and thereby with oxygen inlet 62 for connection to an aircraft oxygen source 92.

Conventional, flexible, oxygen hose 20 fluidically intercouples oxygen outlet 88 with conventional oxygen mask 22 for delivery of oxygen from outlet 88 to the mask 22. The flexible nature of hose 20 allows successive portions thereof to be wrapped around reel tubular body 42 during rotation of reel 14 in the stowage direction thereby placing those portions of hose 20 in a stowage position thereon as mask 22 is moved toward its stowage position. Conversely, when a user grasps mask 22 and pulls it upwardly toward an in-use position, the bias of spring 54 is overcome causing reel 14 to rotate in the opposed second direction for delivering successive portions of hose 20 to an extended position.

In order to prevent biasing spring 54 from exerting a constant tension on hose 20 when mask 22 is in use, stowage unit 10 also includes pawl 94 presenting lever arm 96 and engagement tip 98 (Fig. 4). Pivot pin 100 pivotally and shiftably mounts

pawl 94 to the interior of enclosure 52 and pawl spring 102 biases pawl 94 toward a stop position. In the stop position, engagement tip 98 engages a respective ratchet cam 48 in order to prevent rotation of reel 14 in the stowage direction while so engaged. This prevents biasing spring 54 from exerting a constant tension on hose 20 while mask 22 is being used. Lever arm 96 extends upwardly through slot 103 defined in enclosure 52.

When the use of mask 22 is complete, the crew member reaches within housing 12, shifts lever arm 96 and thereby pawl 94 to the release position allowing the bias of spring 54 to rotate reel 14 in the stowage direction to wrap hose 20 therearound for stowage.

Oxygen hose 20 also includes an externally mounted, tubular, stop ring 104 coupled therewith four or five inches from mask 22 and an oxygen flow indicator 105 coupled in-line between ring 104 and mask 22. Stop ring 104 is positioned above hose guide 106 which is coupled to housing 12 in order to stop shifting of hose 20 when stop ring 104 engages hose guide 106. That is to say, hose guide 106 presents an eyelet 108 or opening therein having a diameter sufficient for hose 20 to pass therethrough but insufficient for stop ring 104 to pass therethrough. This provision prevents biasing spring 54 from exerting a constant tension on the connection between hose 20 and mask 22 when in the respective stowage positions as shown in Fig. 2. This constant tension might otherwise weaken the connection and possibly pull hose 20 from oxygen mask 22.

In the typical aircraft environment, a crew member must be able to use the aircraft communication system while wearing oxygen mask 22. Ac-

cordingly, microphone electrical assembly 24 includes microphone 110 included in mask 22, microphone cable 112, electrical connector 114, and a cable connection jack 116 for conventional coupling with the aircraft communication system 118.

Electrical connector 114 is a conventional unit and includes a rotatable section 120 which is preferably attached to the inboard end of central block 84 and includes electrical terminal 122 located adjacent oxygen outlet 88. Connector 114 also includes fixed section 124 which is coupled to and extends inwardly from attaching piece 76 and is received within and electrically engages rotatable section 120. Cable length 126 electrically intercouples fixed section 124 with connection jack 116.

Microphone cable 112 electrically interconnects microphone 110 with electrical terminal 122 and preferably presents the same length as hose 20 and is coupled thereto in a side-by-side relationship so that hose 20 and microphone cable 112 are simultaneously stowd and payed out from hose reel 14.

Figs. 1, 2, and 3 illustrate mask 22, hose 20, and cable 112 in their respective stowage positions. In these positions, hose 20 and cable 112 are wrapped around hose reel 14 to the limit allowed by stop ring 104 as it engages the upper portion of hose guide 106. In the stowage position, the larger portion of mask 22 is contained within housing 12 below the level of doors 30, 32. Mask stowage opening 40 defined by the configuration of doors 30, 32 allows the sides of mask 22 to be engaged by the inboard edges thereof to suspend mask 22 in place as shown in the drawing figures with an upper portion

thereof exposed through mask stowage opening 40 for grasping by a crew member.

Stowage unit 10 can be readily installed in an aircraft in place of the typically existing stowage box. Housing 12 is designed as a "drop in" unit and once in place, mounting flanges 36, 38 engage the upper surface of the aircraft console or panel with appropriate screws holding flanges 36, 38 in place. After stowage unit 10 is in place, the existing aircraft oxygen source 92 is connected to oxygen inlet 62 and the aircraft communication system 118 is connected to jack 116.

To use mask 22, a crew member grasps the exposed portion thereof and pulls upwardly which action opens doors 30, 32 and extends the desired length of oxygen hose 20 and cable 112 which, in turn, causes hose reel 14 to rotate in the second direction thereby paying out the needed lengths. During this process, pawl 94 continually slides over successive ratchet cams 48. When hose 20 and cable 112 are pulled to the desired length, engagement tip 98 engages a respective cam 48 to hold against the bias of biasing spring 54. The mask is then placed on the user's head as shown in Fig. 5.

After use, the crew member reaches in housing 12 and shifts lever arm 96 against the bias of pawl spring 102 which allows biasing spring 54 to rotate hose reel 14 in the stowage direction thereby wrapping successive portions of hose 20 and cable 112 thereabout until stop ring 104 engages hose guide 106 at which point hose 20 and cable 112 are in their stowage positions. The user then places mask 22 in the stowage position as shown in Figs. 1-3 and closes doors 30, 32 therearound to hold mask 22 in its stowage position.

Having thus described the preferred embodiment in the present invention, the following is claimed as new and desired to be secured by Letters Patent:

Claims:

1. A crew oxygen mask and supply hose stowage unit comprising:

a housing;

a hose reel;

mounting means rotatably mounting said reel within said housing;

a rotary oxygen connector including--

a fixed portion coupled with said housing and including structure defining an oxygen inlet for coupling with an oxygen source, and

a rotary portion rotatably and fluidically coupled with said fixed portion and fixedly coupled with said reel and presenting an oxygen outlet for delivering oxygen from said inlet to said outlet and for rotary motion of said rotary portion and reel relative to said fixed portion and housing;

an oxygen mask;

a flexible oxygen hose fluidically intercoupling said outlet and mask; and

mask stowage means coupled with said housing for releasably stowing said mask in a mask stowage position, said mask being shiftable between said mask stowage position and an in-use position,

said mounting means including means for selective rotation of said reel in a first direction for stowing successive portions of said hose on said reel in a hose stowage position during shifting of said mask toward said mask stowage position, and for selective rotation in an opposed, second

direction for paying out successive portions of said hose from said reel to an extended position during shifting of said mask toward said in-use position.

2. The stowage unit as set forth in claim 1, further including biasing means biasing said reel toward rotation in said first direction.

3. The stowage unit as set forth in claim 2, further including releasable reel stop means coupled with said reel for releasably preventing rotation in said first direction.

4. The stowage unit as set forth in claim 1, said mask including a microphone, said unit further including:

a rotary, microphone connector including --

a fixed section coupled with said housing and including first terminal means for electrically coupling with a communication system of an aircraft, and

a rotary section rotatably and electrically coupled with said fixed section and having a second terminal means electrically coupled with said first terminal means and for electrically coupling with the microphone cable; and

a microphone cable electrically interconnecting said microphone and said second terminal means and thereby with said first terminal means for electrically connecting said microphone with the communication system of an aircraft,

said reel including structure for storing successive portions of said cable thereon during rotation in said first direction during shifting of said mask toward said mask stowage position, and for paying out successive portions of said cable during rotation of said reel in said second direction during rotation of said reel in said second direction during shifting of said mask toward said in-use position.

5. The stowage unit as set forth in claim 4, said unit including means arranging said hose and cable in a side-by-side relationship for simultaneous, adjacent storing and paying out.

6. The stowage unit as set forth in claim 1, said unit including hose stop means for limiting the movement of said hose toward said stowage position.

7. The stowage unit as set forth in claim 6, said hose stop means including a hose guide coupled with said housing having structure defining a hose opening therethrough for shifting of the hose therethrough and including a stop structure coupled with said hose near said mask, said stop structure presenting a greater diameter than said hose aperture for engaging said guide and thereby limiting the shifting of said hose toward said stowage position.

8. The stowage unit as set forth in claim 1, said housing including a mask holder means coupled therewith for storing said mask in a mask stowage position.

9. The stowage unit as set forth in claim 8, said mask holder means including a pair of holder doors hingedly coupled with said housing and shiftable between respective open and closed positions, said doors, when in said closed position, cooperatively presenting structure for holding said mask therebetween and for presenting at least a portion of said mask for grasping and removal by a user, said doors shifting to said open position as the user removes said mask from said mask stowage position.

10. The stowage unit as set forth in claim 1, said unit including oxygen flow indicator means disposed within said hose for visually indicating flow of oxygen in said hose.

11. A crew oxygen mask and supply hose stowage unit comprising:

a housing;

an oxygen mask;

an elongated, flexible, oxygen hose having an oxygen outlet end fluidically coupled with said mask and an opposed oxygen inlet end;

inlet coupling means for fluidically coupling the oxygen inlet of said hose end with an oxygen source;

mask stowage means operably coupled with said housing for storing said mask in a mask stowage position at least partially within the confines of said housing, said mask being shiftable between said mask stowage position and an in-use position wherein the mask is in an extended position outside of said housing and oriented for wearing by a user, said hose remaining coupled with said mask during said shifting and use of the mask; and

retraction means for retracting successive portions of said elongated hose into said housing and into a hose storage position during shifting of said mask toward and into said mask stowage position, and for paying out successive portions of said hose from said housing to an extended position of the hose during shifting of said mask toward said in-use position.

12. The unit as set forth in claim 11, said retraction means including hose support means located within said housing for supporting at least a portion of said hose in a coiled configuration when said hose in said hose storage position.

13. The unit as set forth in claim 12, said hose support means including reel means rotatably mounted within said housing for wrapping said hose portion thereabout in order to place said hose in said coiled configuration.

14. The unit as set forth in claim 11, said retraction means including a fixed portion coupled with said housing, a rotary portion rotatably coupled with said fixed portion for wrapping of said flexible hose therearound, and means biasing said rotary portion in a direction for wrapping said flexible hose therearound.

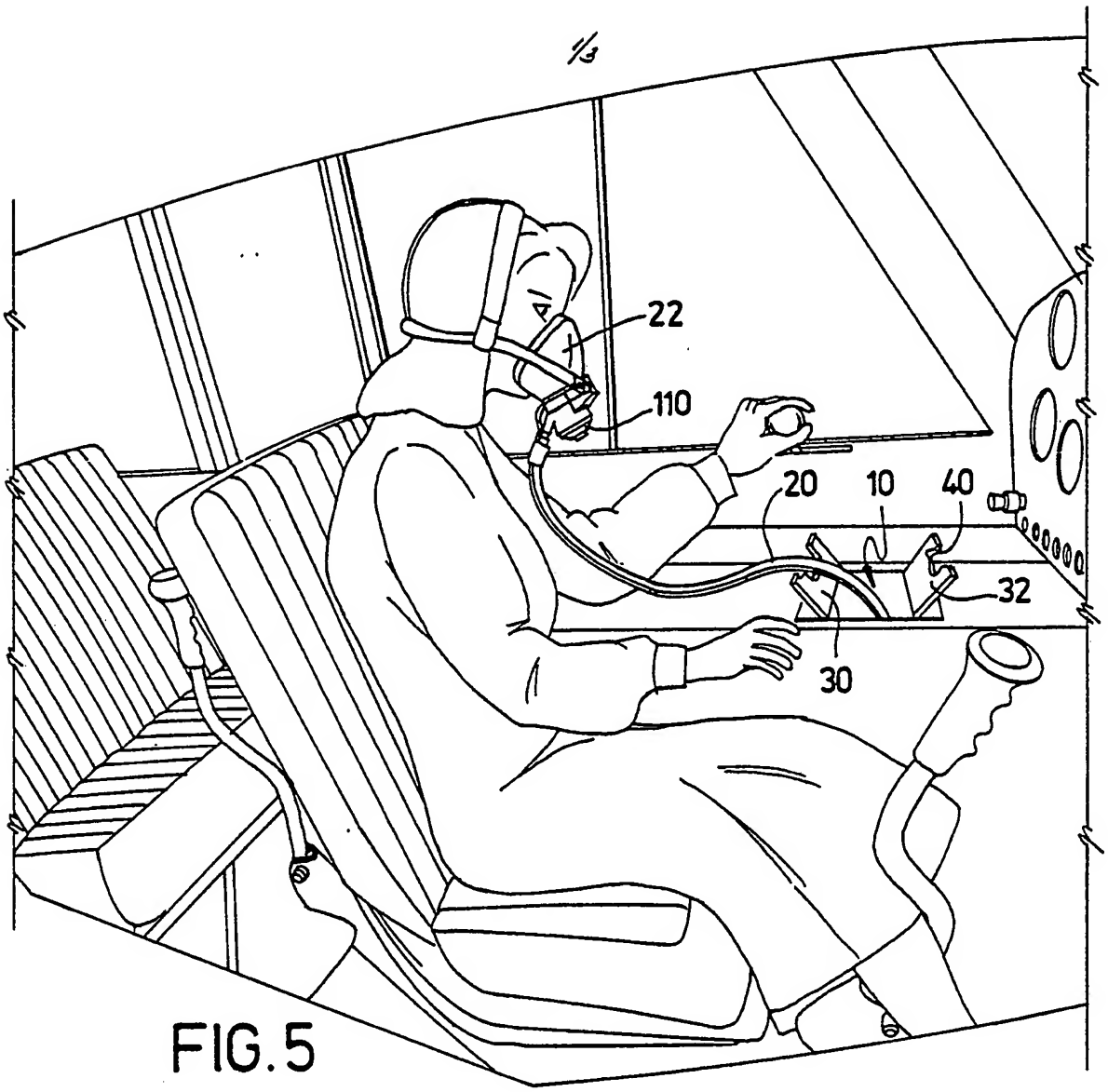


FIG.5

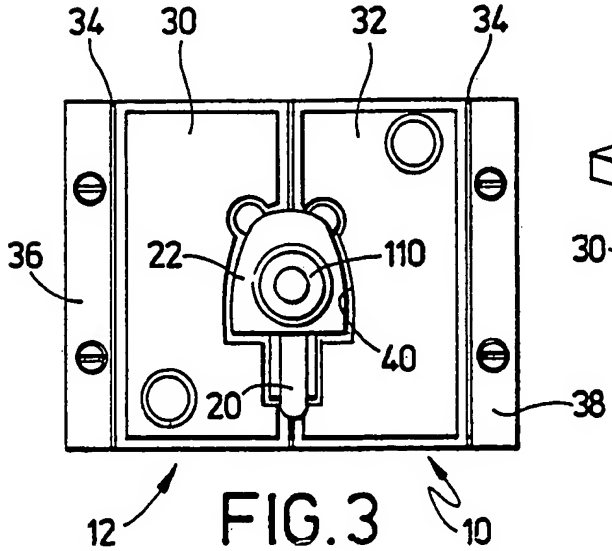


FIG.3

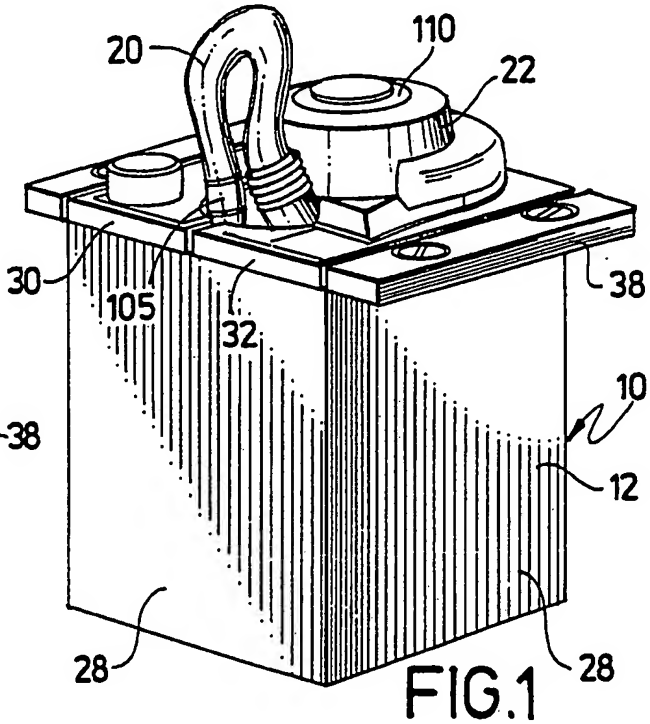
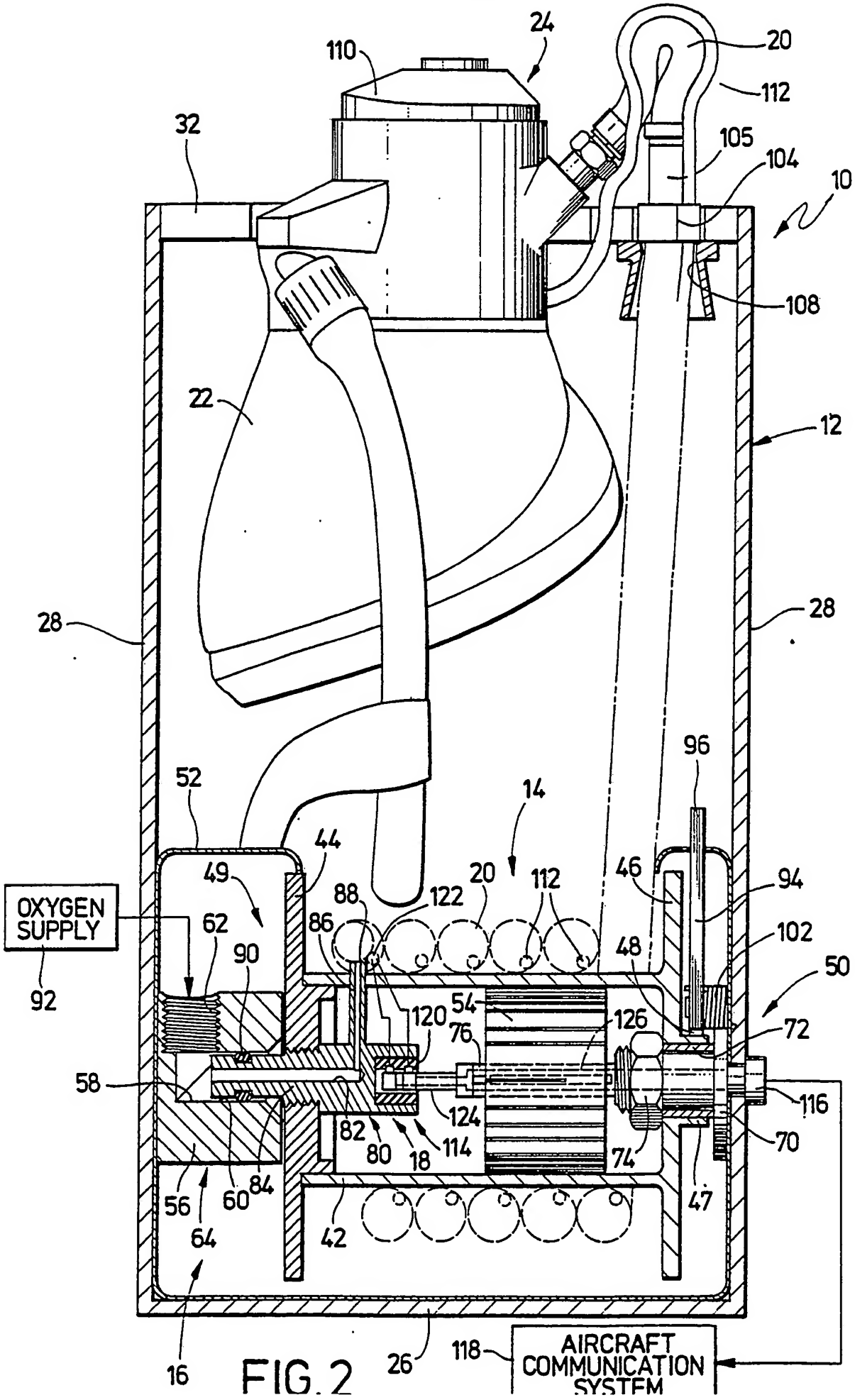


FIG.1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AIRCRAFT COMMUNICATION SYSTEM

FIG. 2

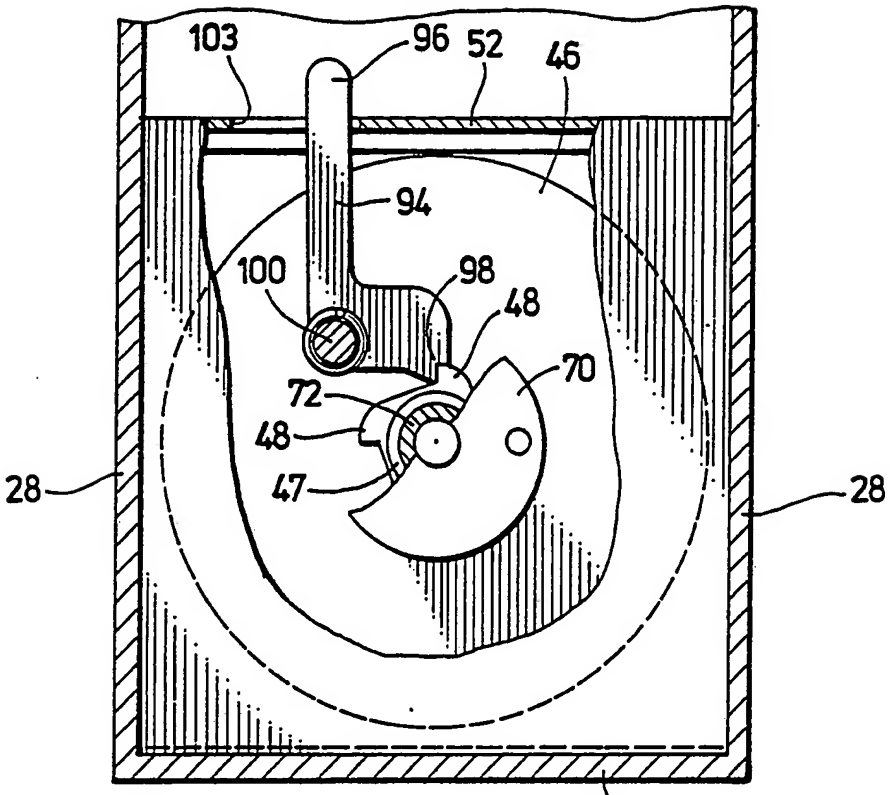

FIG.4

INTERNATIONAL SEARCH REPORT

International Application No. PCT/US89/03856

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

INT. CL. (4) A62B 18/00, 18/08 B65H 75/34, 75/38, 75/48

U.S. CL. 128/201.19, 206.27; 242/86, 107 6

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
U.S. CL.	128/201.19, 206.27; 242/86, 107.6

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
Y	US,A, 3,073,301 (HAY ET AL). 15 JANUARY 1963. See Fig. 1.	1-3, 6-8, 10
Y	US,A, 1,993,617 (NASON), 05 MARCH 1935. See Figs. 1 and 2.	1-3,6-8,10-14
Y	US,A, 989,534 (MACDUFFEE), 11 APRIL 1911. See Figs. 1 and 3.	4,5
Y	US,A, 3,315,674 (BLOOM ET AL), 25 APRIL 1967. See Fig. 1.	4,5
X Y	US,A, 4,154,237 (COURTIER), 15 MAY 1979. See Figs. 2 and 3.	11,12 13,14

* Special categories of cited documents: [10]

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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
03 November 1989	06 DEC 1989
International Searching Authority	Signature of Authorized Officer
ISA/US	Aaron J. Lewis Aaron J. Lewis